Impact of higher maximum weights for lorries on modal split – ex-post analysis for Sweden

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Abstract. The question that is addressed is to what extent the permission of higher maximum weights for lorries leads to a modal shift from rail and waterborne transports to road. Purpose of the project is to analyse how the modal split in Sweden has been influenced by the permission of higher maximum weights for lorries in 1990 and 1993. In contrast to most other European countries, lorries of larger dimensions have existed for a long time in Sweden. An ex-post analysis for the period 1985-2013 is carried out. It comprises an analysis of the official statistics for domestic road, rail and waterborne transports both at the aggregate level and as far as possible at the commodity level, an analysis of the importance of other events as well as a calculation of own price elasticities and cross price elasticities. It is shown that the impact of higher maximum weights for lorries on the modal split varies significantly between commodities. The overall picture is that rail lost market shares during the 1990-ties, but recovered after 2000. One possible explanation is that the deregulation of the domestic rail freight market. The calculated elasticities indicate that the increase in road tonne-km was mainly driven by other factors than modal shifts.

1 Introduction

Road freight transports are responsible for a considerable amount of CO_2 emissions and other external costs. One of the discussed policies to reduce CO_2 emissions is to increase the dimensions of the vehicles. However, an often-cited worry is this will make road freight more competitive, so that the benefits from reduced energy consumption or fewer truck transports are offset by freight being shifted from competing modes with lower carbon intensity.

The extent to which longer and heavier vehicles (LHV) attract transports from the competing modes is therefore a crucial question. The purpose of this project is to provide empirical evidence on this matter, by analysing how the modal split in Sweden has been influenced by higher maximum weights for lorries. Whereas most European countries discuss whether to increase the maximum permissible weight from 40 or 44 tonnes, vehicles of larger dimensions have existed for a long time in Sweden. The maximum length in most European countries is 18.75 m compared to 25.25 m in Sweden. See Table 1.

Table 1. Maximum dimensions for Swedish lorries.

Year	Maximum gross weight	Maximum length
1968		24 m
1974	51,4 tonnes	
1990	56 tonnes	
1993	60 tonnes	
1997		25,25 m
2015	64 tonnes	
2017	74 tonnes	

2 Previous studies

Vierth et al. [1] studied the impacts of having allowed LHV of maximum 40 tonnes and 18.75 m instead of 60 tonnes and 25,25 m. Pålsson et al. [2] studied the impacts of permitting LHV of maximum 74 tonnes and maximum 25.25/34 m. The two studies assume that the transport costs per tonne-km between standard vehicles and LHV differ by 14%-24%. Both studies conclude that HGV are beneficial for society and that reduced transports are the most important benefit.

The two studies apply different elasticities. Vierth et al. [1] assume constant freight transport demand while Pålsson et al. [2] use an elasticity of -0.6 for induced road transport, based on de Jong et al. [3]. Scenario A in Vierth et al. [1] assumes no modal shifts while Scenario B calculates an own price elasticity for road of -0.4 and a cross price elasticity for rail of 1,04. Pålsson et al. [2] use an own price elasticity for road of about -0.3 and cross price elasticities for rail (0.44) and waterborne transports (0.18).

3 Methodology and data

Our approach comprises a) the analysis of the aggregate modal split in terms of domestic tonne-km, b) similar analyses at the commodity level and c) the analysis of other events and d) the calculation of elasticities for the years 1991, 1995, 2000 and 2010 using a forecast based on an auto-regressive model and the Swedish Transport Adminstration's forecast for 2000.

The study is based on official statistics on domestic road, rail and waterborne freight transports between 1985 and 2013. Only statistics up to 2013 are used as the road freight statistics were adjusted in that year. It is partly not possible to differentiate between domestic and international rail freight. We are forced to make restrictions for the analysis at the commodity level as the classification changed in 1997 and 2007.

4 Results

4.1 Aggregate modal split

Regarding the tonne-km development, we see in Figure 1 that road and rail transports increased by about 25% while waterborne transports decreased by about 30%. Rail lost market shares during the 1990-ties, but recovered after 2000. One explanation is that the deregulation of the domestic rail freight market in 1996 has led to new railway undertakings with new concepts.
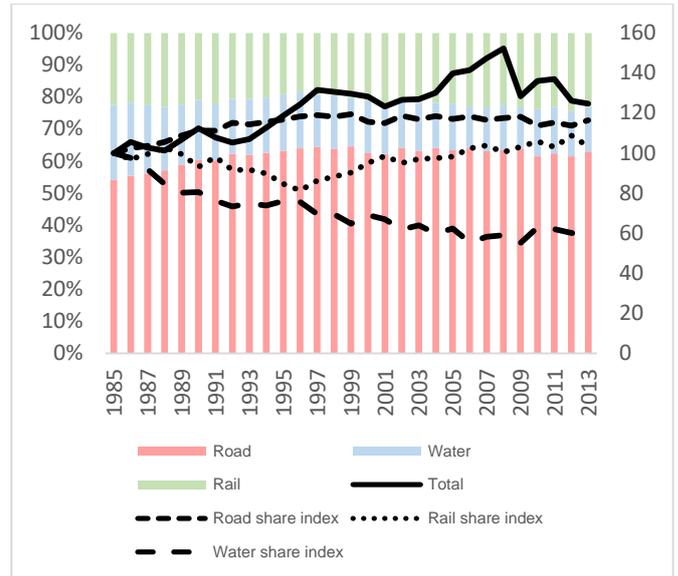

Figure 1 Mode shares of tonne-km on the left axis and index of shares of tonne-kilometres on the right axis.

4.2 Modal split per commodity

Five commodities are comparable over the full period 1985-2013: (1) round wood, (2) sawn, planed forest products, (3) chips and waste wood, (4) paper, paperboard and such commodities and (5) earth, sand, gravel and stones. (Rail data include domestic and international transports.)

Round wood is mainly transported by road and rail. The road share was 55% in 1985 and increased slightly to 2013. Rail lost market share during the 1990s. Heavy storms in 2005 and 2007 led to large tonne-km increases for road and rail. Rail, but not road, stayed on a higher level. See Figure 3.
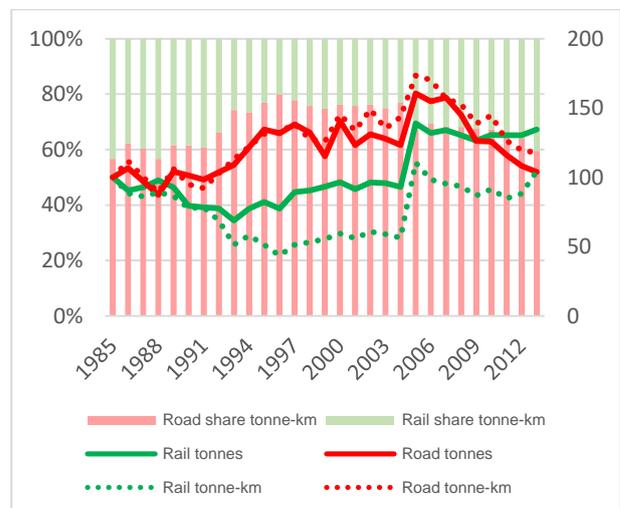

Figure 3 Round wood: tonne-km share on left axis and index (1985=100) in tonnes and tonne-km for domestic and international rail freight and domestic road freight on right axis.

For sawn and planed forest products the road share increased from 35% to 85%. See Figure 4.
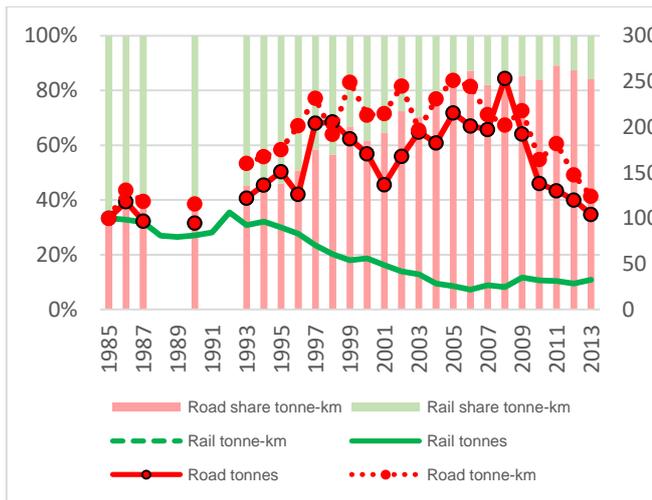

Figure 4 Sawn and planed forest products: tonne-km share on the left axis and index (1985=100) in tonnes and tonne-km for domestic and international rail freight and domestic road freight on right axis.

Paper and paperboard are captive to rail, the high rail share of 70% in 1985 increased slightly till 2013.

Regarding the ten aggregated NSTR-commodity groups, that were used 1997-2006, we conclude that the road share was relatively constant over that period.

4.3 Other events

The analysis above shows also the importance for the storms in 2005 and 2007 for specific commodities. The increase of the road share in the 1990s appears to wear off in the subsequent years. One interpretation of this development is that structural changes in the early 1990s like the economic recession in Sweden 1991-1993 and higher vehicle dimensions led to changes in the transport market, which then stabilized at the end of the century.

4.3 Elasticities

The calculated short term demand elasticities have not the expected signs due to economic recession in Sweden in the beginning of the 1990ties. In 2000, the calculated total elasticities (including induced transports) for road are relatively high (-1,04 to -1.47) while cross-price elasticities are relatively low.

5 Conclusions

The ex-post analysis for Sweden shows that the impact of higher maximum weights for lorries in 1990 and 1993 on the modal split varies significantly between commodities. It is interesting that short term and long term effects differ. The overall picture is that rail lost market shares during the 1990-ties, but recovered after 2000. One possible explanation is that the deregulation of the domestic rail freight market. The calculated elasticities indicate that the increase in road tonne-km was mainly driven by other factors than modal shifts.

References

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